

LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES



**OFFICE OF FISHERIES
INLAND FISHERIES SECTION**

PART VI -B

WATERBODY MANAGEMENT PLAN SERIES

HARDWATER LAKE

**WATERBODY EVALUATION &
RECOMMENDATIONS**

CHRONOLOGY

DOCUMENT SCHEDULED TO BE UPDATED ANNUALLY

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WATERBODY EVALUATION

STRATEGY STATEMENT

Recreational

Sportfish species, primarily largemouth bass (LMB) and crappie are managed to provide a sustainable population while providing anglers the opportunity to catch or harvest adequate numbers of fish to maintain angler interest and efforts.

Commercial

Hardwater Lake does not support high numbers of commercial fish species. The physical characteristics (i.e., acreage and fertility) of Hardwater Lake are not conducive to the production of commercial fish species; therefore a commercial fisheries management strategy is not used.

Species of Special Concern

No threatened or endangered fish species are known to inhabit this waterbody.

EXISTING HARVEST REGULATIONS

Recreational

The LDWF recreational fishing regulations may be viewed at the link below:

<http://www.wlf.louisiana.gov/fishing/regulations>

Commercial

The LDWF commercial fishing regulations may be viewed at the link below:

<http://www.wlf.louisiana.gov/fishing/regulations>

SPECIES EVALUATION

Recreational

Largemouth bass (LMB) populations are targeted for assessment because they are a species indicative of the overall health of the fish population due to their high position in the food chain. Electrofishing is the most efficient sampling method for collecting largemouth bass to evaluate abundance and size distribution, with the exception of large bass. Gill net sampling is the preferred method to determine the status of large bass and other large fish species.

Largemouth Bass

Relative abundance, length distribution and size structure indices-

Electrofishing was used to collect LMB population data in Hardwater Lake in 2002. Catch per Unit Effort (CPUE) results from electrofishing are normally based on the number of fish captured in one hour of electrofishing. This value provides an estimate of relative abundance and allows for monitoring of abundance over a period of time. In Figure 1, springtime electrofishing results are used as an indicator of LMB relative abundance with total CPUE

indicated in 2002. Sampling was conducted in the spring of 2002. Figure 2 indicated that CPUE for all largemouth bass size groups was relatively low. Sampling from 2002 indicated a relatively normal LMB population with good annual recruitment of stock-size bass.

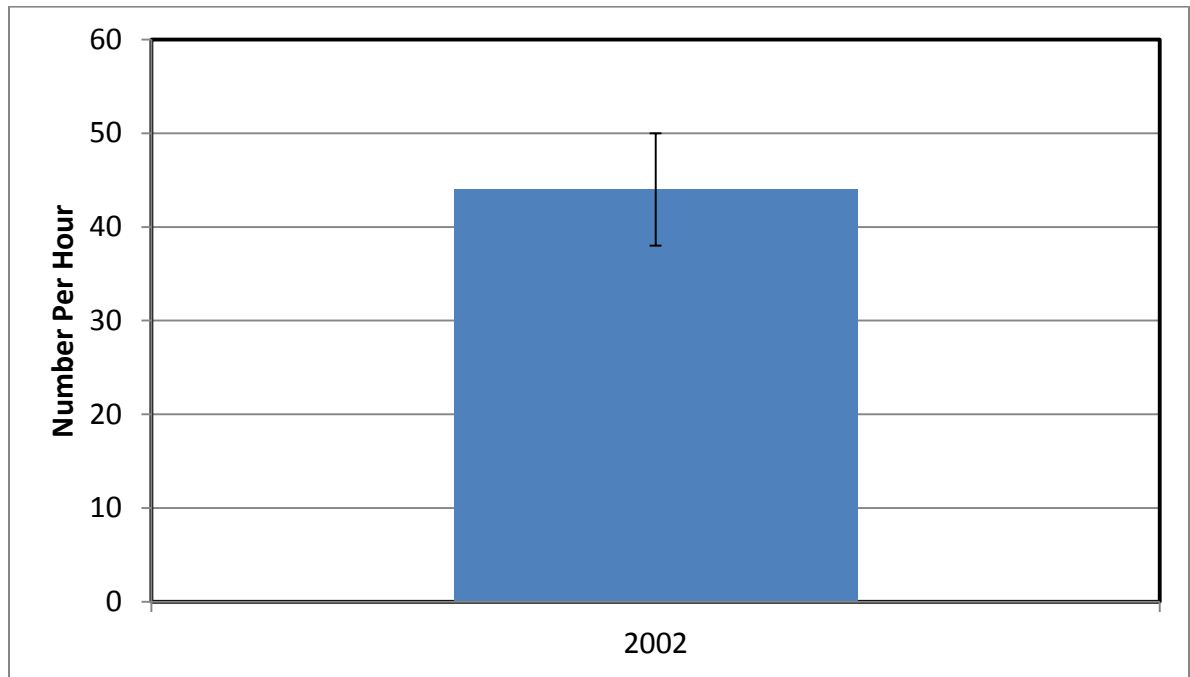


Figure 1. The total CPUE (\pm SE) for largemouth bass for spring electrofishing results from Hardwater Lake, Louisiana 2002.

Catch rate is sorted by inch groups to provide a size distribution model of the population at the time of sampling. The spring 2002 length distribution of the LMB population ranged from 4 to 17 inches total length (TL) with strong representation from the 8-13 inch TL size groups (Figure 3). A healthy fish population should contain an abundance of smaller, younger individuals. Larger fish (≥ 13 inches TL) were found to be less abundant.

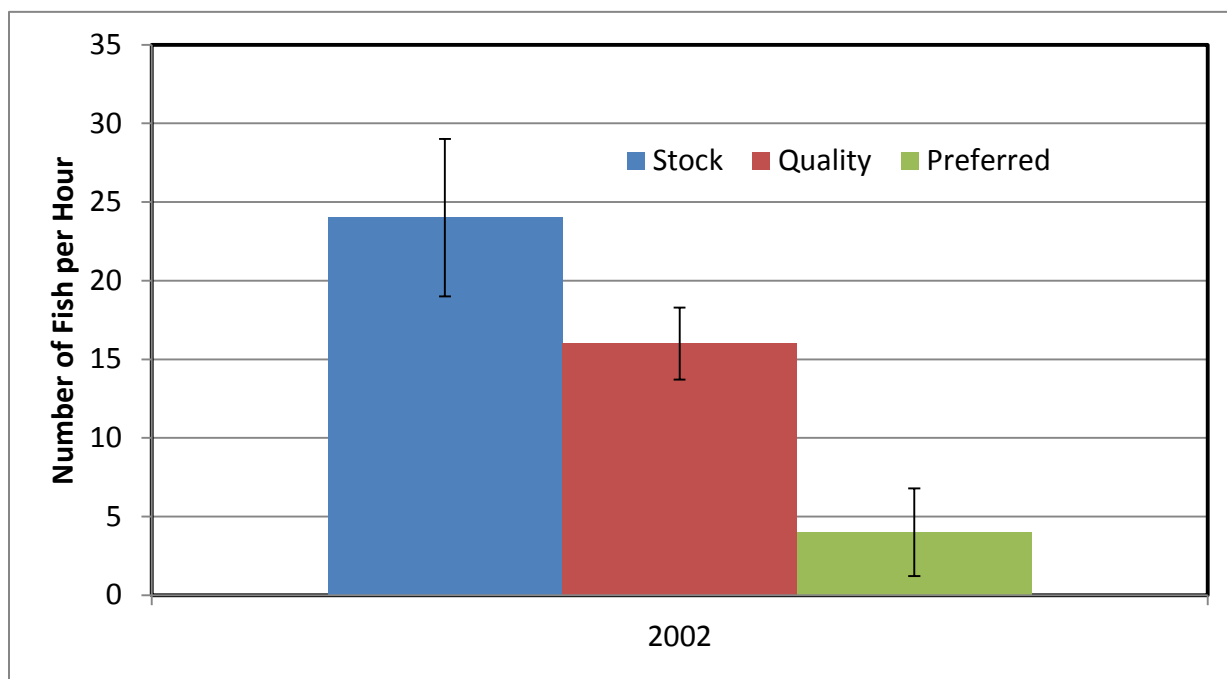


Figure 2. CPUE (\pm SE) for stock-, quality-, and preferred-size classes of largemouth bass on Hardwater Lake, Louisiana for spring season in 2002.

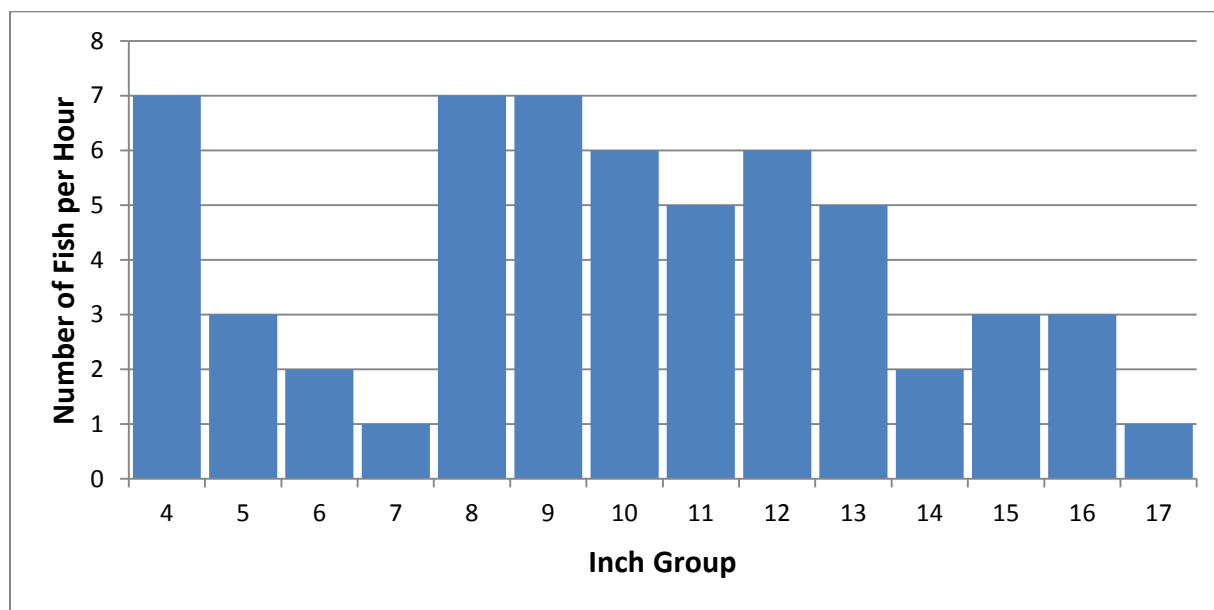


Figure 3. The size distribution (inch groups) of largemouth bass per hour of electrofishing for Hardwater Lake, Louisiana from spring 2002 ($n = 58$).

Proportional stock density (PSD) and relative stock density (RSD) are indices used to numerically describe length-frequency data. Proportional stock density compares the number of fish of quality-size (greater than 12 inches TL for LMB) to the number of bass of stock-size (8 inches TL). PSD is expressed as a percent. A fish population with a high PSD consists mainly of larger individuals, whereas a population with a low PSD consists mainly of smaller fish. For example, Figure 4 indicates a PSD of 67 for 2002. The number indicates that 67% of the bass stock (fish over 8 inches TL) in the sample was at least 12 inches TL or longer. Generally PSD's between 40 and 60 are considered good for central Louisiana lakes.

$$\text{PSD} = \frac{\text{Number of bass} > 12 \text{ inches TL}}{\text{Number of bass} > 8 \text{ inches TL}} \times 100$$

Relative stock density (preferred, RSD_{15}) is the percentage of LMB in a stock (fish over 8 inches TL) that are also 15 inches TL or longer.

$$\text{RSD-p} = \frac{\text{Number of bass} > 15 \text{ inches TL}}{\text{Number of bass} > 8 \text{ inches TL}} \times 100$$

An RSD_{15} value between 10 and 40 indicates a balanced bass population, while values between 30 and 60 indicate a higher abundance of larger fish. The RSD_{15} value for spring 2002 was 18.

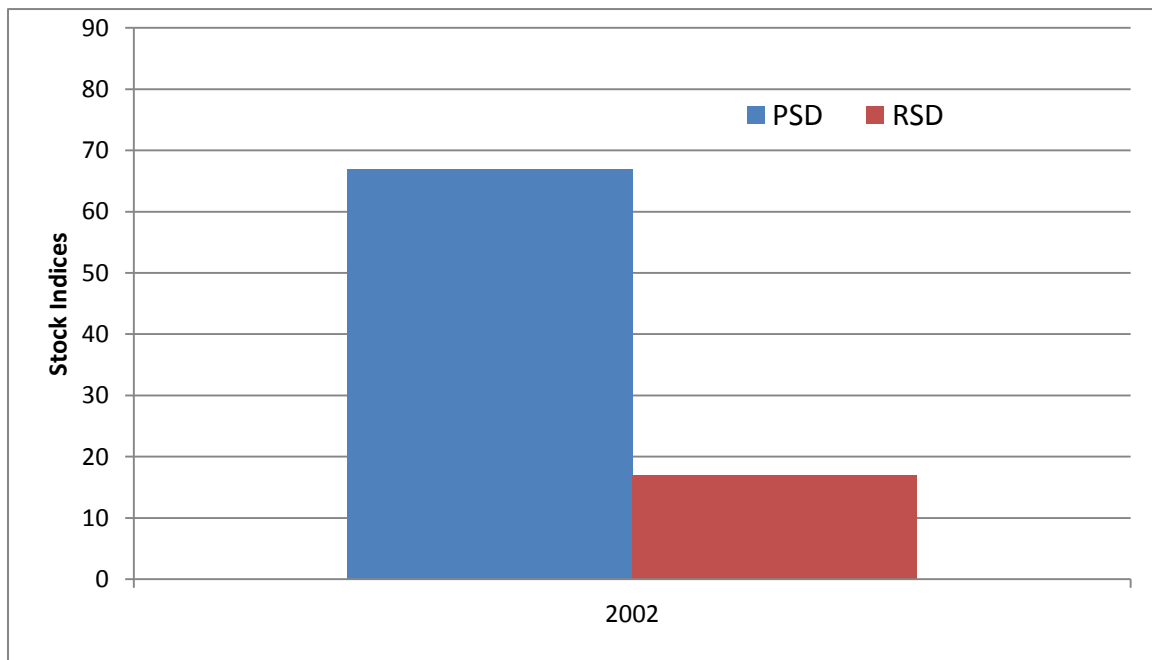


Figure 4. The size structure indices (PSD and RSD-p) for largemouth bass collected from Hardwater Lake, Louisiana during spring electrofishing samples from 2002.

Largemouth bass structural indices indicate PSD and RSD-p values were good for Hardwater Lake in 2002. Overall, stable populations may be expected in upland reservoirs with relatively infertile water and stable habitat.

Largemouth bass genetics

Florida strain LMB have not been stocked into Hardwater Lake.

Forage

Forage availability is measured through two methods: summertime shoreline sampling with haul seines and fall forage electrofishing. Shoreline seine haul results for 1999 – 2001 are shown in Figure 5. Forage availability is also measured indirectly through measurement of LMB body condition or relative weight. Relative weight (Wr) is the ratio of a fish's weight to the weight of a "standard" fish of the same length. The index is calculated by dividing the weight of a fish by the standard weight for its length and multiplying the quotient by 100. Largemouth bass Wr's below 80 may indicate a potential problem with forage availability. The relative weights of largemouth bass collected from Hardwater Lake in 2002 were greater than 90 (Figure 6). Hardwater Lake Wr for stock-, quality-, and preferred-size LMB are with the range considered to be acceptable.

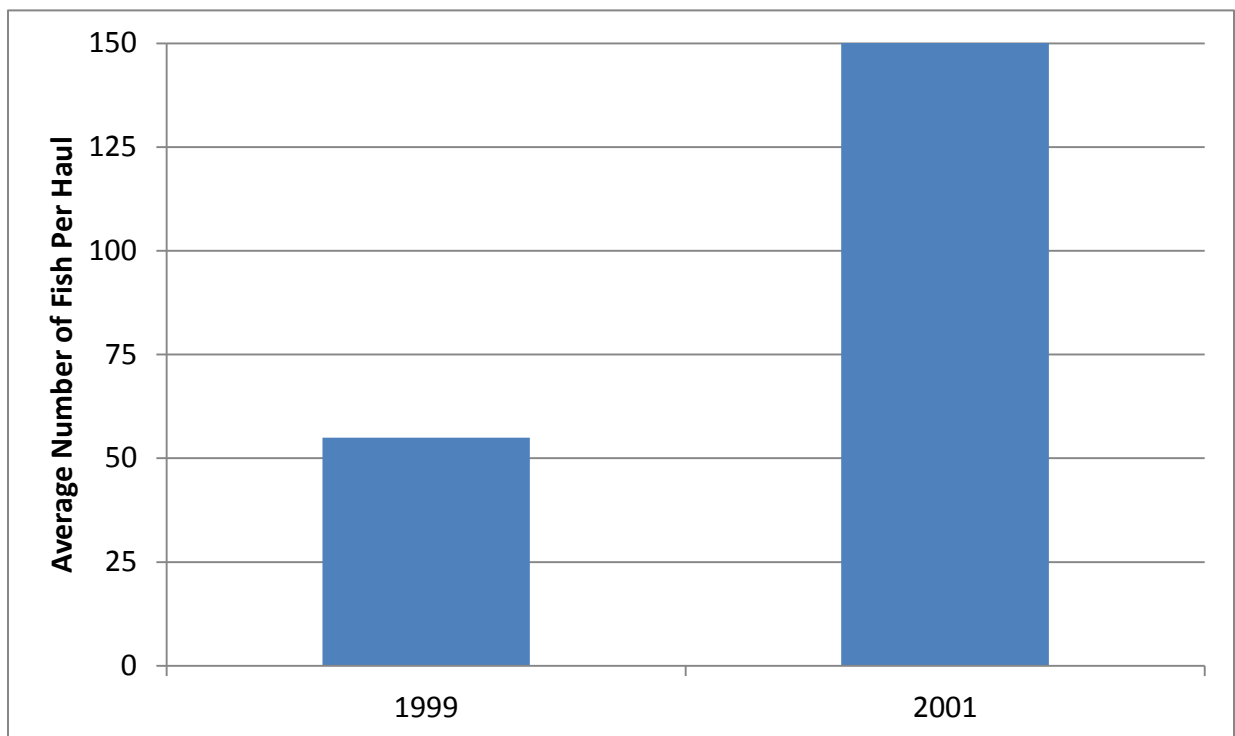


Figure 5. The CPUE (average number per seine haul) of all fish species collected from Hardwater Lake, LA, by shoreline seining from 1999 and 2001.

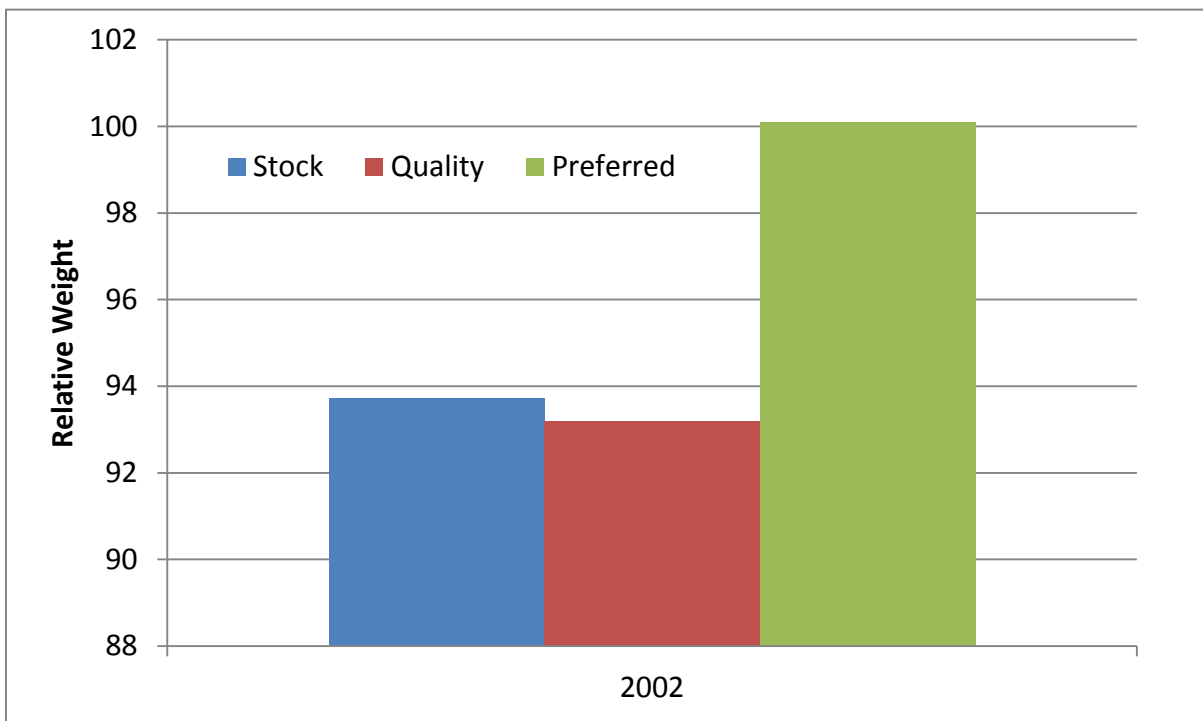


Figure 6. Relative weights for stock-, quality-, and preferred-size classes of largemouth bass collected during fall electrofishing for Hardwater Lake, Louisiana in 2002.

Crappie

Biomass (rotenone) sampling occurred in 1975 and 1984. Very few crappies were collected in these samples. Standing crop averages for each year were less than 0.5 pounds of crappie per acre in Hardwater Lake. A small number of black crappie was collected by electrofishing in 2002 (Figure 7). A number of local crappie anglers utilize the lake. Primarily, the fish are caught in the winter and early spring prior to the emergence of aquatic vegetation. Fishing yo-yo's from cypress tree limbs is also popular during the winter months. Additional crappie population sampling is needed at this time.

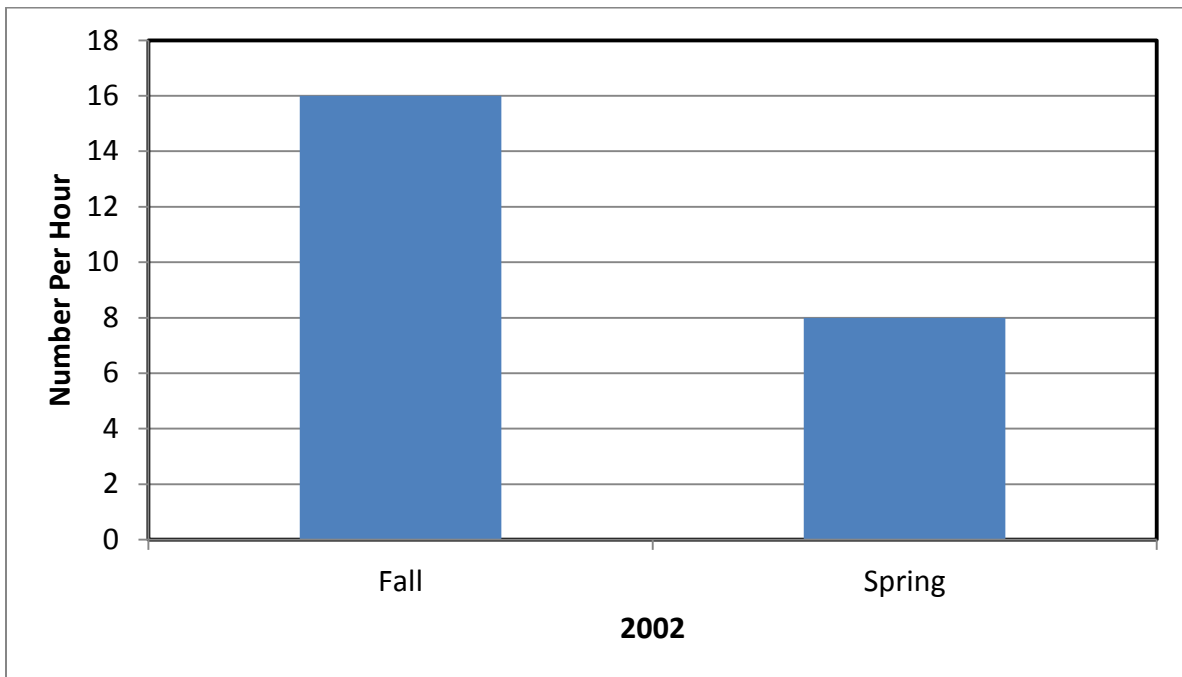


Figure 7. The CPUE (total number per hour) of crappie collected from Hardwater Lake, Louisiana during spring and fall electrofishing for 2002.

Commercial

Hardwater Lake does not support the numbers of large fish species that normally comprise a viable commercial fishery. However, following backwater flooding from nearby Little River, buffalo fish may enter the lake. Gill net sampling was conducted by Louisiana Department of Wildlife and Fisheries (LDWF) personnel in 1988 and 1993. A variety of commercial fish species were collected, but abundance was observed to be low. One exception includes bigmouth buffalo which had high sampling CPUE in 1988. By 1993, bigmouth buffalo numbers had returned to typically low abundance (Figure 8).

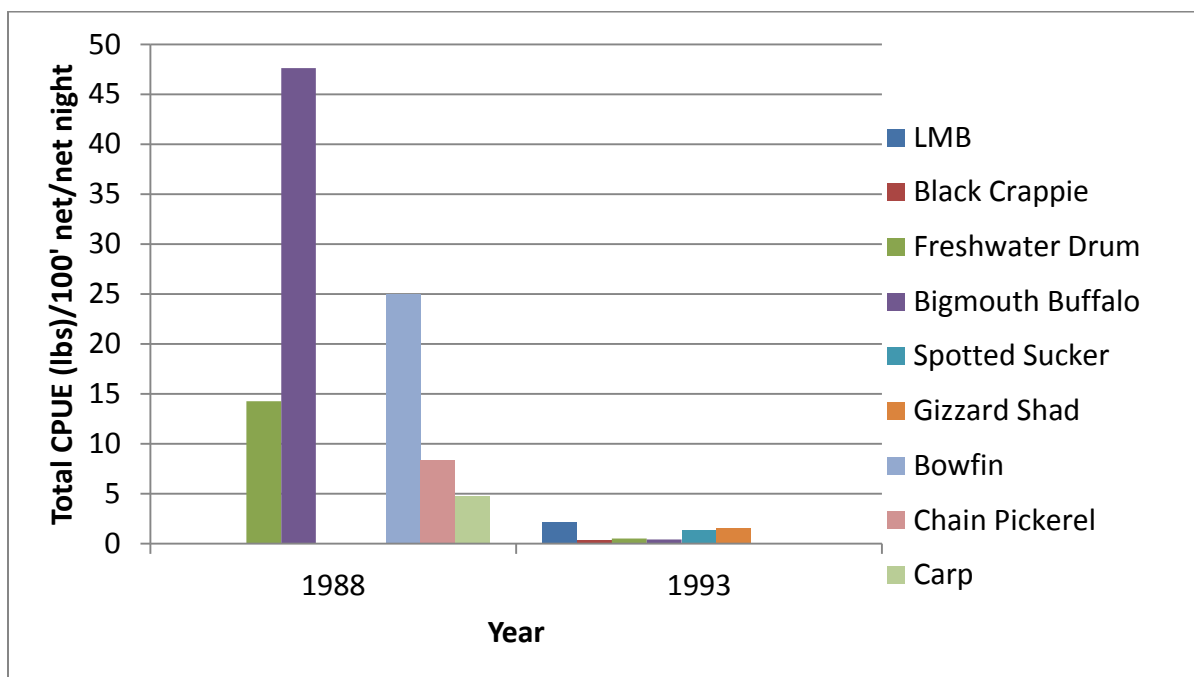


Figure 8. The total CPUE by net night (100' net/net night) by species by year for Hardwater Lake, Louisiana, collected with gill nets in 1988 and 1993.

Species of Special Concern

No threatened or endangered fish species are known to inhabit this waterbody.

HABITAT EVALUATION

Aquatic Vegetation

Historically, Hardwater Lake has been plagued by submersed aquatic vegetation due to its shallow, clear water. Vegetation problems have been sporadic, primarily determined by the amount and duration of backwater flooding from Little River. Submersed aquatic vegetation is typically nonexistent following periods of high water. Several years without high water and submersed aquatic vegetation coverage will reach levels near 100%. Initially, native aquatic vegetation was predominantly found in the shallow water areas of the lake. Submersed vegetation included fanwort (*Cabomba caroliniana*.), bladderwort (*Utricularia sp.*) and coontail (*Ceratophyllum demersum*).

A survey of vegetation conducted on May 8, 2013 indicated that submergent vegetation was causing serious problems in Hardwater Lake. The major problem species were bladderwort and fanwort. Small clumps of hydrilla were also scattered throughout much of the lake. Hydrilla is likely to out-compete the native submersed vegetation in the future and become the dominant species. Results from the survey indicated that submersed vegetation covered more than 90% of the lake. Submergent vegetation coverage was approximately 475 acres. Emergent vegetation was not problematic. Less than 30 acres of alligator weed were present in a fringe along the shoreline. Less than 10 acres of common and giant salvinia were observed.

Results from a vegetation survey conducted in July of 2014 indicated that Hardwater Lake was 100% covered by submersed vegetation. Hydrilla and fanwort coverage of the lake were estimated at 60% and 40%, respectively. A trace amount of common and giant salvinia was observed.

Substrate

Hardwater Lake has a watershed ratio of 1.4 to 1. Water level fluctuation is stable unless backwater flooding occurs from Little River. Turbidity fluctuates and is influenced by backwater flooding. The extensive coverage of submersed vegetation causes increased water clarity. The majority of the watershed is forested. There is no agricultural farming in the watershed and little sediment inflow into the lake. The lake bottom substrate is highly organic, primarily consisting of leaf litter from the extensive cypress and tupelo coverage.

Artificial Structure

Hardwater Lake has an overabundance of natural complex cover including aquatic vegetation and cypress and tupelo timber. No artificial structure is necessary.

CONDITION IMBALANCE / PROBLEM

There is currently an overabundance of submersed vegetation in Hardwater Lake. A range of 15-30% coverage of complex cover is considered desirable for sportfish production. Vegetation coverage is well above the optimal range for fisheries and has been documented since 2000.

Currently, hydrilla and fanwort are causing problems for recreational users of the lake. The combined coverage is near 100 percent.

CORRECTIVE ACTION NEEDED

Hardwater Lake would benefit from a reduction in submersed aquatic plants. A fall/winter drawdown was initiated in 2014 to reduce hydrilla/fanwort biomass. The drawdown is to be followed by a triploid grass carp (TGC) stocking in the spring of 2015.

RECOMMENDATIONS

1. Continue existing recreational regulations until LDWF sampling results indicate that change is appropriate and necessary from a biological perspective or such time as a change in management strategy is indicated by the collective opinion of Hardwater Lake anglers.
2. Continue LDWF standardized sampling to assess fisheries populations.
3. LDWF spray crews will continue treating emergent and floating vegetation on an as needed basis with either glyphosate (0.75 gal/acre) or diquat (0.75 gal/acre) and an approved surfactant (0.25 gal/acre). A mixture of diquat (0.25 gal/acre) and glyphosate (0.75 gal/acre) with Aqua King Plus (0.25 gal/acre) and Air Cover (12 oz/acre) surfactants may be applied to common salvinia. Alligator weed will be controlled with imazapyr (0.5 gal/acre) in undeveloped areas and with Clearcast (0.5 gal/acre) near houses and developed shorelines. Turbulence surfactant (0.25 gal/acre) will be used in conjunction with both of these herbicides.
4. Triploid grass carp (TGC) have been used in some Louisiana waterbodies to provide effective long term control of submergent vegetation. Introduction of triploid grass carp are recommended for Hardwater Lake as described below:
 - a. TGC should be stocked at a rate of 10 fish per acre of submerged vegetation for an estimated number stocked of 5,000.
 - b. To reduce loss from predation, stocked TGC should be at least 12 inches in length.
 - c. To increase survival of stocked TGC, stocking is to occur in early spring 2015 when the water temperature is at or below 70⁰ F.
 - d. TCG should be stocked in the spring of 2015 following the reduction in submersed vegetation from the 2014 drawdown.
5. Continue aquatic vegetation surveys each summer to determine species composition and coverage of aquatic vegetation. Observations will be used to determine the results of the 2015 TGC stocking.